CORNELL-DUBILIER ELECTRONICS SUPERFUND SITE

SOUTH PLAINFIELD, NEW JERSEY

REMEDIAL ACTION REPORT OPERABLE UNIT 2: SOILS REMEDIATION

JULY 2014

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1. Introduction

This Remedial Action Report (RAR) is being submitted in accordance with the U.S. Environmental Protection Agency (USEPA) Guidance OSWER Directive 9320.2-22 -- *Close Out Procedures for National Priorities List Sites* (May 2011). This RAR addresses the soils remediation component of Operable Unit 2 (OU2) at the Cornell-Dubilier Electronics (CDE) Superfund Site (CDE Site). The CDE Site is located in South Plainfield, New Jersey.

The remedial action was performed in accordance with the *Record of Decision for Operable Unit Two* (ROD) signed by USEPA in September 2004 and included the following remedial components listed below. Polychlorinated biphenyls (PCBs) and other contaminants identified in the ROD were considered the primary contaminants driving the remediation at the OU2 property.

- Excavation of an estimated 107,000 cubic yards (CY) of contaminated soil containing PCBs at concentrations greater than 500 ppm and contaminated soils that exceed the May 1999 list of New Jersey's Impact to Groundwater Soil Cleanup Criteria (IGWSCC) for contaminants other than PCBs;

- On-site treatment of excavated soil amenable to treatment by low-temperature thermal desorption (LTTD), followed by backfilling of excavated areas with treated soils;

- Transportation of contaminated soil and debris not suitable for on-site LTTD treatment to an off-site facility(s) for disposal, with treatment as necessary;

- Installation of a multi-layer cap or hardscape;

- Installation of engineering controls;

- Property restoration; and

- Implementation of institutional controls.

The remedial action work was performed by Sevenson Environmental Services, Inc. (SES) under Pre-Placed Remedial Action Contract (PRAC) W912DQ-04-D-00023-0011, Soils Remediation awarded by the U.S. Army Corps of Engineers (USACE). The OU2 Remedial Design for Soils Remediation, dated June 2008, was developed by Malcolm

Pirnie, Inc. (Malcolm Pirnie), under Contract No. W912DQ-06-D-0006-0001 with USACE.

This RAR was developed by The Louis Berger Group, Inc. (Louis Berger) and ARCADIS-US, Inc. (ARCADIS), under contract to Louis Berger. ARCADIS purchased Malcolm Pirnie during the project. Information contained in this RAR was provided by SES and USACE. USACE performed oversight of the construction activities and assessed conformance with the design documents for USEPA Region II.

2. Site Description and Background

2.1. Site Location and Description

The CDE Site is located in South Plainfield, Middlesex County, New Jersey. The OU2 portion of the CDE Site (hereafter referred to as the OU2 property) is located at 333 Hamilton Boulevard; the historic location of CDE's South Plainfield manufacturing facility. Figure 1 shows the location of the OU2 property. The fenced 26-acre lot is now vacant, covered by an asphalt cap. It is bounded on the northeast by the Bound Brook and Consolidated Rail Corporation's (Conrail) tracks; on the southeast by the Bound Brook and a property used by the South Plainfield Department of Public Works; on the southwest, across Spicer Avenue, by single family residential properties; and to the northwest, across Hamilton Boulevard, by mixed residential and commercial properties.

2.2. CDE Site History

The former CDE facility, most recently known as the Hamilton Industrial Park, was occupied by CDE from 1936 to approximately 1962. The original facility, a complex that eventually grew to 18 buildings, was built in the early 1900s by Spicer Manufacturing Corporation, later known as Dana Corporation (Dana), a manufacturer of automobile components. Dana moved its operations to the Midwest in the 1929. In 1936, Dana leased the facility to CDE. In 1956, CDE purchased the facility from Dana.

CDE operated at the facility from 1936 to 1962, manufacturing electronic components including, in particular, capacitors. PCBs and the degreasing solvent trichloroethylene (TCE) were used in the manufacturing process, and the company disposed of PCB- and TCE-contaminated material directly on the facility soils. CDE's activities led to widespread chemical contamination at the facility, as well as migration of contaminants to areas near the facility. PCBs were detected in the groundwater, soils and in building interiors at the industrial park, at adjacent residential, commercial, and municipal properties, and in the surface water and sediments of the Bound Brook. High levels of volatile organic compounds (VOCs) were found in the facility soils and in groundwater.

After CDE's departure from the facility in 1962 until the closure and demolition of the buildings in 2007, the subsequent property owner of the facility operated it as a rental property, the Hamilton Industrial Park, with over 100 commercial and industrial companies occupying the facility as tenants. Commercial and industrial operations since 1962 may have contributed to some CDE Site contamination, but the PCB and VOC contamination appears to be attributable to CDE's activities.

Environmental conditions at the CDE Site were first investigated by the New Jersey Department of Environmental Protection (NJDEP) in 1986. In June 1996, at the request of NJDEP, USEPA collected soil, surface water and sediments at the facility, revealing elevated levels of PCBs, VOCs, and metals. In 1997, USEPA conducted a preliminary investigation of the Bound Brook and collected surface soil and interior dust samples from nearby residential and commercial properties. These investigations led to a fish consumption advisory for the Bound Brook, and removal actions at a total of 15 residential properties.

In 1998, USEPA included the CDE Site on the National Priorities List (NPL). USEPA is the lead agency and the NJDEP is the support agency.

The USEPA divided the CDE Site into four separate Operable Units. Operable Unit 1 (OU1) includes a number of residential and commercial properties near the former CDE facility that were contaminated by soil and dust generated at the facility that spread to these nearby properties. Operable Unit 2 (OU2) is the former CDE facility itself; OU2 is the subject of this report. Operable Unit 3 (OU3) consists of the observed extent of CDE Site-related VOCs found in groundwater, and encompasses approximately 825 acres of land area. Operable Unit 4 (OU4) is the Bound Brook study area of the CDE Site.

The ROD called for remediation of soils as described in Section 2.3.2 below; it also addressed the remediation of the Capacitor Disposal Area (CDA) and remediation/demolition of existing OU2 buildings. This RAR addresses the soil remediation component of the OU2 remedial action. The building demolition action component of OU2 was addressed in a previous phase of the remedial action and documented in a separate RAR dated August 2009. The excavation, transportation, and disposal of the soils from the CDA was also addressed through a previous phase of the remedial action and documented in a separate RAR dated August 2010.

2.3. OU2 Investigation and Design Background

2.3.1. Remedial Investigation / Feasibility Study

A Remedial Investigation (RI) was conducted for OU2 by Foster Wheeler Environmental Corporation (FWENC) in December 2002 (*Final Remedial Investigation Report for Operable Unit 2 (OU-2) Facility Soils and Buildings*) in response to Work Assignment 01 8-NCO-02GZ, issued under USEPA RAC 11 Contract Number 68-W-98-214. The RI report presented the activities and findings of the RI performed in regard to OU2 soils and buildings. The RI was performed to define the nature and extent of the contamination in the OU2 soils (shallow and subsurface) and buildings (and associated drainage systems). This was accomplished by: defining the boundaries of the dump fill area; locating and delineating other potential source areas; investigating the potential for building contamination; determining local geologic conditions; characterizing site contaminants; and assessing the risks to human and ecological receptors.

The Feasibility Study (FS) was prepared by Tetra Tech-Foster Wheeler, Inc. in April 2004 (*Final Feasibility Study Report for Operable Unit 2 (OU-2) Facility Soils and Buildings*) in response to Work Assignment 018-RICO-02GZ and 118-RICO-02GZ under the same USEPA Contract as the RI. The FS report summarized the findings of the RI and developed the Remedial Alternatives evaluated in the ROD. Final remediation goals were determined in the ROD, which is discussed below.

2.3.2. Record of Decision

Remediation of the OU2 soils was performed as part of the remedial action selected in the ROD dated September 2004. The ROD presents the Selected Remedy to address OU2 which is based on the Administrative Record file for the CDE Site.

2.3.3. Remedial Design

The Pre-Design Investigation (PDI) field sampling program, outlined in the *Final Soils Field Sampling Plan* (Malcolm Pirnie, 2006), was conducted to collect supplemental data and fill data gaps from the RI. The *Final Soils Pre-Design Investigation Report* (Malcolm Pirnie, August 2007) provides an overall summary of the collection, analysis, and evaluation of historic and PDI data for OU2 property soils in accordance with the response action selected in the ROD.

The *Design Analysis Report, Operable Unit 2 – Soils* Remediation (DAR; Malcolm Pirnie, June 2008), developed as part of the Final Design for Soils Remediation (Malcolm Pirnie, June 2008; hereafter referred to as the Final Design) contains an overall description of the design for the soils component of the OU2 remedy based on the RI and PDI results. It includes the excavation, treatment using LTTD, re-use or disposal of contaminated OU2 soils and debris, and backfilling of the excavated areas in accordance with the ROD. OU2-specific details, such as suggested soils excavation sequencing, operations, and final restoration, are also addressed in the Final Design.

The restoration component of the design included the installation of hardscape and construction of a storm water conveyance system to drain the completed 22-acre cap. The designed hardscape was bituminous pavement, as described in Section 3.17. A series of storm water catch basins connected by high density polyethylene (HDPE) piping (of varying diameters) and a Stormwater Detention Basin with Surface Sand Filter (Basin) were designed to accomplish proper drainage, as described in Section 3.16. In addition to being an aspect of restoration, the hardscape cap serves as an engineering control as specified in the Selected Remedy in the ROD, limiting direct contact with OU2 soils containing PCB concentrations over 10 ppm.

2.3.4. Cultural Resource Investigations

Three Cultural Resource Investigations were conducted at the OU2 property, including:

- Phase IB Deep Testing within the Archaeologically Sensitive Portions of the Site;
- Archaeological Investigation of the Former Power House Foundation at the Site; and
- Investigation of the Unanticipated Wall Discovery Adjacent to the Archaeologically Sensitive Portion of the Site.

A summary of these three investigations, being prepared under a separate cover by ARCADIS, was unavailable at the time of this report but will be added as Addendum 1 upon completion.

2.4. Regional Geology/Hydrogeology

The discussion of the regional geology presented in this section is based on published geologic data (Schlische, 1992, Michalski, 1990, Michalski and Klepp, 1990, Michalski and Britton, 1997, Herman, 2001), the DAR, and results of the OU3 RI.

2.4.1. Regional Geology

Prior to the OU2 remedial action, unconsolidated deposits at the OU2 property ranged in thickness from 0.5 to 15 feet and generally thickened to the east towards Bound Brook. Natural unconsolidated materials, consisting primarily of red-brown silt and sand with silt and clay layers, were generally intermixed with urban fill materials (including cinders, ash, brick, glass fragments, metal, and other detritus) throughout the OU2 property and vicinity. A thin (surface to 15 feet below ground surface (bgs)) layer of weathered bedrock overlaid competent bedrock, consistent with the weathered bedrock identified by regional surficial geologic mapping. This material primarily consisted of heavily weathered siltstone and shale material with a heterogeneous texture ranging from silt to fine sand, with some zones of angular, silty gravel and silty clay.

The OU2 remedial action required the removal of unconsolidated deposits of varying depths for on-site LTTD treatment or off-site disposal. Treated material and other material from off-site sources were backfilled as described in Section 3.15.

The top of competent bedrock underlying the OU2 property ranges from 4 to 15 feet bgs, except in the northwestern portion where bedrock was present immediately beneath the previously-existing building foundations. Based on boring log data from wells installed during the OU3 investigation, the bedrock at the OU2 property consists primarily of red-brown to dark brown mudstone, siltstone, and shale consistent with the Passaic Formation. Boring logs from wells to the north of the OU2 property are generally indicative of Passaic Formation mudstone facies, while rock cores from the OU2 property and areas to the southwest and east show siltstone and shale. The bedrock units range from massive rock with few features to highly laminated beds. The bedrock units are consistently fine-grained in texture, with numerous calcified veins and vugs throughout.

2.4.2. Hydrogeology

The OU2 property lies within the Bound Brook watershed. Bound Brook is directly adjacent to the OU2 property and forms the northeast border of the property. Bound Brook extends from east to west through Edison, South Plainfield, New Market, Dunellen, and Middlesex. Spring Lake is an impoundment of Cedar Brook. The confluence of Cedar Brook with Bound Brook is north and downstream from the OU2 property. The Cedar Brook is the largest of the Bound Brook tributaries and drains approximately 6.5 square miles. The impoundment at the western end of Spring Lake is man-made, formed by constructed dams and spillways, and controls the discharge flow of Cedar Brook into Bound Brook. Spring Lake supports secondary contact recreation including boating and fishing.

The shallow water bearing zone underlying the OU2 property extends from ground surface to a depth of approximately 120 feet bgs and is hydraulically connected to Bound Brook, Cedar Brook and Spring Lake. This surface water influence disappears with depth. Groundwater movement in both the intermediate and deep water bearing zones is primarily to the northwest of the OU2 property and arcs to the north and northeast.

2.5. Wetlands

A delineation of wetlands was completed in May 2007 by Malcolm Pirnie based on the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (1989) to demarcate wetland/non-wetland boundaries as part of the remedial design for OU2. These delineated wetlands are included in the OU2 Remedial Design Drawings. More information can also be found in the *Revised Final Habitat Assessment Report for Operable Unit 2 Soils* (Malcolm Pirnie, 2008; included as Appendix C of the DAR).

Two wetlands areas were identified within the boundaries of the OU2 property. One is approximately 0.30 acres and the second one is approximately 0.06 acres. Restoration of the OU2 wetlands areas removed during the OU2 soils remedy was deferred to future work to be performed under OU4.

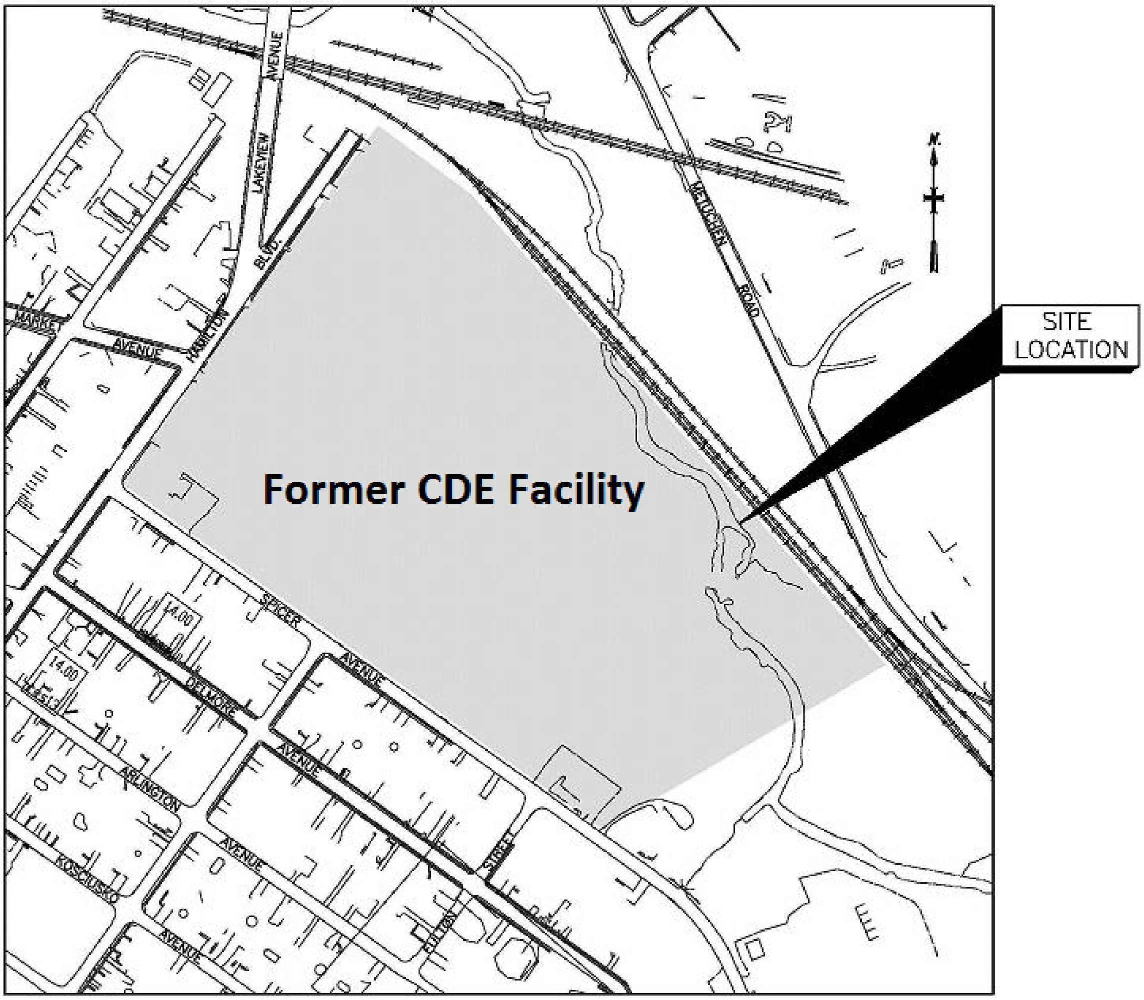
2.6. Remediation Goals

Remediation goals (RGs) were developed by the USEPA in accordance with the USEPA's December 1991 guidance document titled *Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals)* and USEPA's August 1990 guidance document titled *Guidance on Remedial Actions for Superfund Sites with PCB Contamination* (PCB Guidance). Based on the PCB Guidance and other guidance documents, and taking into consideration the New Jersey non-residential direct contact soil cleanup criterion for PCBs of 2 ppm for commercial/industrial properties that was in effect at the time the ROD was issued, USEPA selected a RG of 10 ppm PCBs for capping soil to prevent direct contact and a RG of 500 ppm PCBs for excavating and treating soil.

To address VOCs in soil that may act as a continuing source of groundwater contamination, USEPA identified the New Jersey impact-to-groundwater criterion as the RG. These RGs were memorialized in the USEPA ROD for OU2.

Although PCBs and VOCs were the most prevalent contaminants at the OU2 property, there were a number of other contaminants present. While other contaminants, such as arsenic and lead, were identified in the risk assessment as incremental contributors to the direct contact risks, USEPA did not identify specific RGs for these other contaminants because the primary risk driver, PCBs, is ubiquitous across the OU2 property and USEPA determined that OU2 remedy would address the risks posed by those other contaminants.

Figure 1
OU2 Property Map



3. Remedial Construction Activities

The remedial construction was performed in accordance with the remedial design documents as described above. Thirty six technical specification sections were prepared that provided specific details on the implementation of the remedial construction. The specifications are included in Appendix P.

OU2 remedial construction activities started in October 2008 and were completed in September 2012. A summary of the construction activities completed for the soil remediation phase of OU2 is presented below. Table 1 identifies major subcontractors and vendors associated with the remedial construction.

Contaminated soil and debris were excavated and treated on-site or transported off-site for disposal. Material that was treated on-site by LTTD was confirmed by analytical results to have Total PCB concentrations less than 10 ppm and other chemical contaminant concentrations less than the IGWSCC standards prior to being backfilled on-site. After excavation, the OU2 property was capped with hardscape (asphalt), which is an engineering control to control direct contact with the remaining concentrations of contaminants.

3.1. OU2-Specific Plans

Work was performed in accordance with OU2-specific project plans prepared by SES. The plans were developed in accordance with the project design documents. USACE reviewed and accepted the plans prior to commencement of field activities. OU2-specific work plans were developed to address all major project elements. Most of these work plans were related to the general site operations. However, the work plans related to the pertinent OU2-specific operations are listed below and provided in the appendices as specified.

- Accident Prevention Plan/Site Safety and Health Plan (SSHP) (Appendix B)
- PCB Protection Plan (Appendix B)
- Dewatering Work Plan (Appendix B)
- Excavation and Material Handling Plan (Appendix B)
- Excavation and Support Plan (Appendix B)

- Dust Control Plan (Appendix B)
- Waste Management Plan (Appendix J)
- Field Sampling Plan (FSP)/Sampling and Analysis Plan (SAP) (Appendix N)
- Quality Assurance Project Plan (QAPP) (Appendix N)

3.2. Community Relations

The community relations goals for this project were to:

- Provide information about upcoming construction activities to nearby residents using a medium that most efficiently conveyed that information;
- Provide information in a way that community members would understand; and
- Give the information to the residents at a time when it would be most important to them.

To accomplish these goals, a number of tools were used: flyers, newsletters, and interviews with newspapers and television media. A community relations policy was established that required prompt responses to community inquiries (e.g. phone messages to all community relation coordinators). This high visibility of USEPA personnel also helped to establish and preserve a high level of public acceptance and trust. Successful community relations were cultivated using the different tools mentioned above at one time or another throughout the duration of remediation activities.

3.3. Pre-Construction Activities

3.3.1. Pre-Construction Meeting

Pre-construction meetings were held to coordinate the efforts of all parties involved in the project prior to commencement of work. Participants involved in the pre-construction meetings included representatives from USEPA Region 2, USACE New York District, and SES. Pre-construction meetings were held at the OU2 property on November 12, 2008, December 10, 2008, and March 4, 2009.

3.3.2. Pre-Construction Videos and Photographs

Prior to start of the OU2 soils remedial action, SES obtained pre-construction videos and photographs. The pre-construction video and photographs documented the existing condition of the OU2 property, residential areas, haul roads, and temporary staging area. Appendix U includes pre-construction photographs including photo logs and videos.

3.4. Site Preparation

Prior to the beginning of the soils remedial activities, site preparation activities including temporary facilities mobilization, decontamination facilities, erosion and sediment controls, and site security were performed. Summaries of these activities are presented below.

3.4.1. Temporary Facilities

Temporary support facilities were located within the western portion of the OU2 property. The support facilities consisted of seven trailers. These trailers were used by the USEPA, USACE, SES, and Essential Security Service (SES' security subcontractor). Trailers were also used for site health and safety activities, decontamination facilities, worker's break room, and subcontractor activities. Temporary water, sanitary, electric and telephone services were established and the support zone was completely secured within the OU2 property by a 6-foot-high chain link fence.

3.4.2. Chain Link Fence Removal and Installation

The existing fence installed during previous OU2 activities was utilized for adequate security during the remedial activities. As remedial activities were completed and restoration commenced, new fencing was installed. The fencing on either side of the New Market extension was installed by the Borough of South Plainfield, NJ (Borough) as part of their work to build the roadway extension for New Market Avenue.

3.4.3. Site Security

As part of site preparation activities, a Site Security Plan was developed. Essential Security Service of South Plainfield, New Jersey provided OU2 security. OU2 security was provided during all non-working hour (16 hours per day) and 24 hours a day on weekends and holidays. The security guard was stationed in an office trailer located within the support zone at the entrance to the OU2 property. All visitors were required to sign-in upon entering the support zone.

3.4.4. Equipment Decontamination Facilities

A mobile metal pan/decontamination pad (12 foot wide by 25 foot long) was installed within the Contamination Reduction Zone (CRZ) at the OU2 property for personnel and equipment decontamination leaving the Exclusion Zone (EZ). The pad was located at the entrance to the soil remediation area and was constructed using 10-mil polyethylene liner. Berm containment and a water collection sump were also provided. The sump was equipped with an electric pump. Collected wastewater was pumped into a mobile storage tank on-site prior to treatment by the on-site water treatment system and ultimately disposed of off-site.

The equipment decontamination facility was utilized throughout the project duration. All vehicles and equipment exiting the EZ were decontaminated prior to entering the support zone or leaving the OU2 property. The decontamination process began with the removal of soil via shovels/scrapers and brushes, followed by pressure washing to remove all visible soils and other potential contaminants from the equipment. All equipment was visually inspected to ensure that soils and other visible contamination were removed.

Mobile storage tanks were utilized throughout the remediation activities for the storage of groundwater collected during the excavation work. The contents of each tank were sampled and characterized and then processed through the on-site water treatment system prior to off-site disposal.

3.4.5. Soil Erosion and Sediment Control

SES, in conjunction with Glynn Geotechnical, prepared and submitted to Freehold Soil Conservation District (FSCD), a Soil Erosion and Sediment Control Plan for the soils remediation phase. Correspondences regarding this plan are included in Appendix C.

To control off-site erosion during precipitation events, silt fence, coir wattles and or hay bales encompassed the down-stream perimeter areas of the OU2 property and the excavated soil staged in stockpiles for treatment and/or off-site disposal. Approximately 2,500 linear feet of erosion control measures were installed around the OU2 property. Storm water inlets were covered with filter fabric to prevent siltation of the system and fugitive distribution of sediments.

3.4.6. Access Roads/New Market Avenue Extension

All traffic (e.g. site personnel, subcontractors, truck traffic, and visitors) entering and exiting the OU2 property initially utilized the entrance located at the intersection of Hamilton Boulevard and New Market Avenue. This entrance was utilized due to the existing traffic control that was already in place (signal light) which provided a safe ingress and egress.

During the early stages of the project, the Borough took title to a portion of the OU2 property so that New Market Avenue could be extended from Hamilton Blvd, eastward connecting with Spicer Avenue at the intersection of Spicer Avenue and Garibaldi Avenue. The intent of the road extension was to eliminate truck traffic making turns on Hamilton Avenue and reduce road congestion in the area caused by the remedial work. The Borough hired a contractor to install the roadway (extension) including all drainage features and fencing. Prior to the Borough performing the road work, SES completed the remediation of this area. The Borough's contractor installed three drainage pipes to capture stormwater from this previously remediated and capped portion of the OU2 property's southwest corner. Six foot chain link fences with access gate were installed on either side extension completing the work.

After the construction of the New Market Avenue extension, the site entrance established on Hamilton Boulevard at the northwest area of the OU2 property was utilized for the remainder of the project. A chain link construction swing gate was constructed at the new access road entrance, which remained closed during all non-work hours. SES was responsible to lock and unlock the gate at the appropriate times. A sign restricting access except for construction activities was posted at the gated entrance. The entrance was locked and security personnel were present during non-work hours. The vehicle gate was left in place upon completion of demobilization activities. Two additional site entrances (gates) were installed for access to the New Market Avenue extension as remedial activities progressed. These gates were also left in place upon completion of the work.

The Borough placed truck travel restrictions on Hamilton Boulevard from New Market Avenue south towards Durham Avenue. In order to comply with this restriction, all truck traffic was required to utilize Borough truck routes. The typical route from the OU2 property was west on New Market Avenue to South Clinton Avenue, south on South Clinton Avenue to Hamilton Boulevard, then using Hamilton Boulevard for access to Route 287.

When required, flag persons were utilized to escort oversized tractor trailers entering and exiting the OU2 property.

3.4.7. Abandoned Monitoring Well

One previously abandoned monitoring well was discovered during the remedial action. The monitoring well was examined by a New Jersey-licensed driller, under contract to ARCADIS, in accordance with NJDEP regulations (New Jersey Administrative Code, N.J.A.C. 7:9-9). The examination revealed that the well was previously abandoned by others and had been grouted; the casing was subsequently cut as necessary to accommodate final site grading.

3.4.8. Stockpile Area Construction

A waste management stockpile area was constructed on the asphalt cap of the previously excavated CDA portion of the OU2 property. A 40-mil HDPE liner was originally installed over the asphalt to protect the area. Concrete bin blocks were placed on three sides of the stockpile area to control migration of soil and sediment from the stockpiles. Rain water that contacted contaminated soils and accumulated in the stockpile area was collected and pumped to the on-site water treatment system. Stockpiles were managed in accordance with the Waste Management Plan, Dewatering Work Plan, and Excavation and Material Handling Plan to prevent migration of the contaminated soil. Stockpiles were graded and covered at the end of each day using 6-mil thick polyethylene sheeting, or reinforced polyethylene tarps. All stockpiles were inspected and maintained on a daily basis.

In some cases, contaminated soil was temporarily staged within the area of excavation before loading into on-site hauling vehicles prior to LTTD treatment or off-site disposal. The soils were temporarily staged at a location that drained into the active excavation area. The temporary staging was implemented for wet materials excavated below the water table to allow gravity drainage of free water from the soils before loading into on-site hauling vehicles.

3.4.9. Load-out Platform Construction

A load-out platform was constructed in the southern portion of the OU2 property to facilitate load-out and transportation of the waste material. The load-out platform was constructed adjacent to the stockpile area with concrete bin blocks placed along the perimeter of the load-out area. The excavator load-out platform was elevated utilizing excavated OU2 property soils and heavy timbers, approximately 2.5 feet high from the ground surface to facilitate loading of soil into trucks. 10-mil polyethylene sheeting was placed in the truck load-out area to facilitate cleanup of any spilled soil and prevent migration of contaminated materials. The platform allowed up to two trucks at a time to back into the load-out area in front of the excavator platform. An excavator was used to transfer materials from various stockpiles and load the trucks. Each truck was lined prior to loading. Once the trucks were loaded, trucks were covered and weighed on the on-site truck scale prior to leaving the OU2 property.

Quality control inspections were conducted during the on-site material transfer and load-out operations to prevent spills, minimize cross contamination, and to ensure proper maintenance of equipment. SES performed waste shipping inspections of the trucks prior to the trucks leaving the OU2 property. These inspections included:

- Visual inspection for holes in the bed of the box;
- Removal of previous placards and labels;
- Checking for the presence of free standing water;
- Any required addition of absorbent;
- Placement of required placards;
- Checks for leakage once loaded;
- Checks for tarpaulin and bungee installation;
- Directions for leaving the OU2 property (truck routes);
- Destinations;
- Installation of waste decals; and
- Manifesting

3.5. Decontamination

Remedial work activities were performed in the contaminated EZ and construction support activities were conducted in non-contaminated support zones. All personnel and equipment leaving the EZ were decontaminated in designated CRZs prior to entering the support zone. All contaminated vehicles and equipment were cleaned and decontaminated prior to entering the support zone and leaving the OU2 property.

3.5.1. Personal Decontamination

Personnel decontamination was performed upon exiting the EZ at the end of each work day in accordance with the SSHP. Personnel decontamination was performed in the CRZ located outside the EZ. Decontamination stations were staged in various locations for personnel decontamination. As site personnel left the EZ, soil or other potential contaminated media was removed from the workers' outer clothing and boots. All disposable personal protective equipment (PPE), including outer boots, Tyvek suits, and outer gloves, were placed in plastic garbage bag-lined containers for proper disposal.

3.5.2. Equipment Decontamination

A mobile decontamination pad was utilized in the CRZ located adjacent to the EZ. The decontamination area consisted of a temporary pad, constructed of 20-mil HDPE liner and overlain with gravel. All vehicles and equipment exiting the EZ were decontaminated prior to entering the support zone or leaving the OU2 property. The decontamination process began with the removal of soil and other potential contaminated media via shovels/scrapers and brushes, followed by pressure washing. All equipment was visually inspected to ensure that soils and other visible contamination were removed from the equipment prior to removal from the CRZ. The decontamination pad was sloped to a sump, where water from the decontamination process was collected. Water that collected in the sump was pumped to the on-site water treatment system.

3.6. Work Zone and Perimeter Air Monitoring

Work Zone and Perimeter Air monitoring was conducted by SES to characterize personnel exposures and fugitive emissions generated from the performance of the remedial activities. The air monitoring procedures that were implemented are described below. Appendix E includes monthly air monitoring report summaries and Table 2 identifies the OU2 property perimeter action levels.

3.6.1. Work Zone Monitoring

Work zone air monitoring was performed in accordance with the SSHP to ensure the protection of on-site workers and visitors. Work-zone air monitoring was performed for VOCs, combustible gases lower explosive limit (LEL), oxygen, carbon monoxide, and hydrogen sulfide using RAE Systems Area RAEs (RAEs). The RAE is a gas vapor detector equipped with a wireless radio frequency which allowed the unit to communicate and transmit readings on a real-time basis to a remotely located base controller. The RAEs operated continuously during work shifts when excavation activities were taking place (when the potential for release of organic vapors was at its highest). Work-zone air monitoring was performed for respirable particulates using a TSi DustTrak Model 8520 portable dust meter (DustTrak). The DustTrak unit is a portable, battery operated, laser photometer, which was used to measure and record airborne dust concentrations to provide an assessment of worker exposure to airborne contaminants such as dust, smokes, fumes and mists. The DustTrak used light scattering technology to determine the particulate concentration in real-time.

In the event exceedances above the OU2 action levels occurred, the crew members working within or near the excavation and stockpile area would upgrade to Level C PPE. In addition, crew members working within or near the load-out area would upgrade to Level C PPE when the VOCs levels were above OU2 action levels. The crew members working within the fractional tanks at the on-site water treatment system would also upgrade to Level C PPE prior to commencement of these activities.

3.6.2. Perimeter Air Monitoring

3.6.2.1. Air Monitoring and Sampling Procedures

A monitoring and sampling program was used to detect and quantify organic vapors, respirable particulate, oxygen, combustible gas, and PCBs. This was accomplished by implementing both real-time and USEPA-approved method TO-4A air monitoring protocols. The real-time program was used to detect and quantify organic vapors, respirable particulate, oxygen, and combustible gases. USEPA method TO-4A was used to qualify and quantify airborne PCBs.

REAL-TIME MONITORING

Real-time monitoring for respirable dust was conducted using the Met One E-Sampler (E-Sampler). The E-Sampler uses both light scatter and gravimetric methods to determine airborne dust.

Four E-Samplers were placed at the OU2 property perimeter. One of these monitors was placed in the upwind position. The purpose of this monitoring location was to determine the background level of respirable dust. The other three were located in the downwind position. The positioning of these instruments was determined based on the meteorological data, primarily wind direction and the professional judgment of the air monitoring technician. The air monitoring technician took into account the location of work relative to the receptors, type of work being performed, and potential for airborne emissions. These locations were documented on an OU2 property map and were part of the daily air monitoring report. This monitoring was conducted 24 hours per day, 7 days per week.

RAEs, as described above in Section 3.6.1, were placed at the same locations as the E-Samplers. This monitoring was conducted during the excavation of contaminated material.

HIGH VOLUME PCB MONITORING

Sampling and analysis for total airborne PCBs was conducted using USEPA Method TO-4A. In this method, a high volume sampler was used to collect PCBs on a sorbent cartridge containing polyurethane foam (PUF). The sampler was operated for 24 hours, and the sample was sent to a laboratory for analysis. This high volume PUF procedure is capable of determining a PCB reporting limit of 1 µg.

Tisch Environmental High Volume Sampling Pumps, equipped with PUF sampling heads, were used during the first two weeks of excavating, handling, and treating of contaminated material. The high volume samples were placed in the same locations as the real time instruments.

The data generated from this initial monitoring was used to determine whether the total PCB action level was exceeded and whether there was a correlation between the real-time dust results and total PCB. This evaluation was conducted by the air quality specialist, who would prepare a report and provide recommendations to the USACE. PCB monitoring was then modified, if needed.

3.7. Dust Control

Dust control was a primary focus during the remedial action. Throughout the remedial action, best engineering practices (including air monitoring, dust control and erosion control) were used to protect the safety of the workers and surrounding community during construction.

Water was sprayed from fire hydrants or water trucks as the primary method for dust suppression. This limited and/or contained dust from migrating from the OU2 property during excavation and backfill activities. Other actions taken, to the extent practicable, to minimize dust included:

- Minimizing concurrent operations;
- Applying water to and sweeping haul roads;
- Wetting and misting equipment and structures;
- Spraying mist on buckets during material handling and dumping;
- Placing polyethylene sheeting on the ground surface where trucks are loaded;

- Loading material into trucks without dropping it from heights above the truck body;

- Hauling materials in properly covered containers;

- Covering stockpiled materials;

- Reducing the active work area surface; and

- Washing construction equipment regularly.

3.8. Pre-Excavation Activities

3.8.1. In-Situ Soil Stabilization

During the waste characterization of soils, the analyses revealed that some of the soil material exhibited mixed waste characteristics, containing both concentrations of PCBs subject to the Toxic Substances Control Act (TSCA) and Resource Conservation and Recovery Act (RCRA) characteristics for metals. SES utilized its patented Maectite process to stabilize the material during excavation so the Toxicity Characteristic Leaching Procedure (TCLP) analyses no longer exceeded the allowable RCRA criteria. By using this in-situ treatment, the material could be disposed of at a Subtitle C facility (a facility capable of receiving TSCA waste) without first being subject to off-site treatment, resulting in a substantial savings on the disposal costs to the project.

The process consisted of in-situ stabilizing of the on-site soil with the Maectite agent by mixing the soils with the agent utilizing a backhoe. The agent was sprayed on the soils during mixing operations. Once the soil was mixed, samples were collected and analyzed for RCRA constituents. The analytical results were presented to the disposal facility and upon the facilities approval; the soil was transported and disposed of at the Subtitle C facility. Approximately 8,640 tons of material was treated with the Maectite process.

3.9. Excavation

The OU2 property was divided into 30 foot by 30 foot grids (900 square feet each) in order to track work progress and perform confirmation sampling in accordance with the NJDEP regulations. The designated areas of the OU2 property were excavated to the design depths indicated by the OU2 Remedial Design Drawings. Typical depths of excavations were zero to two feet (0-2’), two to six feet (2’-6’), and six feet to bottom depth which was either a fourteen foot depth or to bedrock. As discussed in Section 3.12.1, once a grid was excavated to the design depth, post-excavation soil samples were collected and analyzed to ensure the RGs were achieved. Floor samples were not collected at bedrock elevations. Sampling was performed in accordance with NJDEP protocols and the accepted SAP, testing both the base of the excavation and the side walls. When the RGs were met, the grid was backfilled. When the analysis indicated that RGs were not met, additional excavation of the grid was performed, both vertically and horizontally, as required. When RGs were not met at the base, an additional two feet of material was typically excavated to remove the contamination. Once the additional excavation was performed, re-sampling was performed on that particular grid. The iterative process of excavating and re-sampling was performed until the RGs were achieved in a grid. Mitkem Laboratories, 175 Metro Center Blvd., Warwick, RI (Mitkem), performed the post-excavation analysis of the soil. Final sample results are included in the soil sampling logs included in Appendix H.

Abandoned pipes (e.g. water, drainage, etc.) were located where they exited the OU2 property and excavated. The trenches were then backfilled with soil to prevent the migration of water from the OU2 property. The abandoned ends of these pipes were plugged with concrete.

When active pipes traversed the OU2 property near remediated excavation areas (e.g. 36" water and 10" sanitary sewer mains), the material around the pipes was removed. Soil samples were then collected and analyzed from under the pipes to ensure the RGs were achieved. Migration paths were then sealed.

Processing was performed on excavated material scheduled for LTTD treatment, which is further described in detail in Section 3.11 below. Initial soil processing included screening excavated soils through a mechanical screen to reduce the soils' physical size to two inch minus. The screen size was eventually reduced to one inch minus to assist in the LTTD processing.

Moisture conditioning of the soil was also performed to ensure the moisture content of the soil was less than twenty percent (<20%) as required to assist in the proper treatment of the soils by the LTTD process. Once SES processed the excavated material, the soil was staged in an 82 by 101 by 27 foot high temporary sprung structure, erected on the OU2 property, to keep the soil out of the weather. This structure made it possible to perform LTTD operations during inclement weather. Oversize material from the screening operation was characterized and shipped off-site for disposal at a licensed disposal facility.

During remedial excavation activities, remnants of building foundations and utility tunnels were found at the north area of the OU2 property. In these instances, the soil was removed and the foundations and tunnels were left in place. Samples were collected to ensure the RGs had been achieved.

A total of 157,644 CY of material was excavated by SES. Appendix A includes drawings with the grid overlay system used by SES on the project and the excavation elevations (depth) of the remediated grids.

3.9.1. Consolidated Rail Corporation Remediation

Soil investigations along the northern portion of the OU2 property revealed that OU2-related contamination continued onto the Conrail right-of-way for the Lehigh Valley Line (L.C. 10-0502) and the Perth Amboy Industrial Track (L.C. 10-0510), located along the north and adjacent to the OU2 property. Remediation of this area included barrier erosion protection and the excavation and off-site disposal of soils containing PCBs and other OU2-related chemical contaminants, as identified in the ROD.

Consistent with Conrail requirements, the work was performed up to but no closer than 10 feet to the center line of the active rail lines. Ingress and egress to the work areas was conducted from Hamilton Boulevard and the north side of the OU2 property. No rail tracks were crossed to perform the remedial activities. The entire study area was cleared of all vegetation and the excavation areas were grubbed of all tree stumps. Stormwater and erosion control measures were installed in accordance with the soil erosion and sediment control plans for the OU2 property. The excavation work was conducted using an excavator. Excavated material was loaded into heavy hauler trucks and transported to the OU2 property for further processing. Excavations were protected by the use of high visibility fencing placed around the work area. The excavated material was hauled off the property and disposed of in accordance with applicable federal and state laws.

The depth of the excavation on the Conrail right-of-way was approximately two feet below existing grade surface and did not go deeper than the existing shale sub-grade, which was approximately four feet below grade. When all accessible soils containing PCBs and other OU2-related chemical contaminants in concentrations above the OU2 ROD criteria were removed from the property, the excavated areas were restored with clean dense graded aggregate (DGA) backfill. The entire area was then covered with DGA as a final cover and compacted. All work activities were overseen by the USACE.

The location of this work is identified in the Record Drawings included in Appendix A; the confirmatory sample results are included in Appendix H; the backfill material data is included in Appendix I; and the applicable photographs are included in Appendix U.

3.9.2. Non-Intact Tank Removal

During the installation of the storm water drainage system, remnants of an eight thousand (8,000) gallon non-intact storage tank were found in the clean utility corridor of the drain line excavation at grid D-23. The remnants were removed from the drain line excavation and disposed of off-site.

3.9.3. Thirty-six Inch Water Main

A thirty-six inch water main owned by New Jersey American Water Company (NJAW) traverses the OU2 property, from the southwest corner at the intersection of Hamilton Blvd and New Market Avenue to the northeast area of the property (proximate to the Basin outflow structure).

Hand excavation methods were utilized to locate the pipe during remedial activities. When the pipe was located, only 10 to 13 lineal feet of pipe were exposed for excavation. Once the soil was removed from around the pipe and the area was sampled for compliance, it was then backfilled. This process continued until the pipe cleared the remedial area.

During remedial activities, on February 18, 2011, leakage was observed from the water main in the vicinity of grid P-15. NJAW was notified of the situation and a crew was dispatched to shut down the main. Upon investigation, NJAW noted the main had deteriorated over time, leading to a break in a section of the main, causing the leakage. NJAW crews, with the assistance of SES' manpower and equipment, replaced approximately 15 lineal feet of the main. The main was flushed out by NJAW and water samples from the downstream flow of the pipe were collected and analyzed for PCBs to ensure no contamination had entered the pipe. Water samples revealed that no contamination had entered the system. Water was restored after a 24-hour period of repairs, backfilling, flushing, etc. had elapsed.

The confirmatory sample results are included in Appendix H; the backfill material data is included in Appendix I; and the applicable photographs are included in Appendix U.

3.9.4. Monitoring Well Protection/Restoration

Monitoring wells on the OU2 property were identified and marked to be protected prior to excavation. As excavation proceeded around each well, the well casing was exposed and painted red to identify the potential hazard. Cones, caution tape, and other barricades were erected around each well to further delineate the location. Backfill was placed with caution to avoid compromising the well integrity. Once final grades were obtained, a driller, under subcontract to ARCADIS for OU3, installed flushmount casings on 10 wells and erect bollards around the 5 wells remaining as stickups.

3.10. Water Treatment System / Excavation Dewatering

An on-site water treatment system was used to treat water generated from dewatering excavations. A pretreatment permit was issued by the Publicly Owned Treatment Works (POTW), Middlesex County Utilities Authority (MCUA), to receive treated water discharged from the treatment system.

Groundwater encountered during the excavation activities was collected using electric sump pumps and gas powered pumps and stored in 20,000 gallon mobile storage fractional (influent) tanks. When a particular tank was filled, the water was processed through the on-site water treatment system as described above. Treated water was placed in separate 20,000 gallon mobile storage fractional (effluent) tanks and analyzed for chemical properties listed in the MCUA permit. Mitkem performed the chemical analysis of the treated groundwater once it was processed through the system. No water was discharged until acceptable laboratory results were received and treatment goals were met. Water was discharged into the local municipal sewer system located at the north-center area of the OU2 property for additional processing by the MCUA.

A total of 3,224,764 gallons of water were collected, treated, and disposed of at the local POTW as part of the remedial action activities. Appendix F includes the water treatment system schematics and results from the water analysis.

3.11. Low Temperature Thermal Desorption (LTTD)

In accordance with the ROD, contaminated soils amenable to treatment were treated on-site using an LTTD system. LTTD is a treatment process using heat to physically separate contaminants from the soil. During LTTD operations, soil is fed into a rotating kiln and heated to approximately 700 degrees Fahrenheit. The contaminants are desorbed from the soil and are destroyed in the kiln’s combustion chamber. The off-gas from the combustion chamber is also treated to remove any remaining contaminants for off-site disposal. The LTTD treatment goal was to treat soil to 10 ppm or less for PCBs. The treated soil was used as back-fill material at the OU2 property.

SES subcontracted the LTTD process to Maxymillian Technologies, Inc., (MT). MT utilized a company-owned Indirect Desorption System (IDS) for LTTD operations at the OU2 property. A detailed technical description of the LTTD treatment system utilized at the OU2 property is provided in Appendix G along with other pertinent LTTD-related documents (e.g. the New Jersey Air Permit Equivalency and LTTD tracking log).

3.12. Soil Sampling and Analysis

Post-excavation and Waste Characterization sampling and analysis of soils were performed as described in the accepted SAP. Samples were collected and analyzed for PCBs (analyzed by SW-846 method 8270C, SW-846 method 8082 for PCB Aroclors) and other non-PCB contaminants subject to ROD RGs based on NJDEP IGWSCC. Additionally, sampling and analysis of post-LTTD treated soils was performed to ensure the treated material met the standards outlined in the ROD.

3.12.1. Post-Excavation Confirmation Samples

Post-excavation confirmation soil samples were collected from each grid within the excavation area following removal of contaminated soils. The objective of the post-excavation confirmation soil sampling was to verify that the remedial action had achieved applicable project specific RGs. Post-excavation confirmation soil samples were analyzed by Mitkem, on a 72-hour turnaround time, for analysis as per the accepted QAPP.

Post-excavation confirmation samples were collected within each excavation grid at a frequency of one sample per every 900 square feet of bottom area and one sample for every 30 linear feet of sidewall. Bottom samples were biased towards areas and depths of the greatest contaminant concentrations based on previous analytical results, and/or field screening (i.e. photoionization detector (PID) readings, olfactory, visual evidence or staining). When no data were available to bias the sample locations, samples were collected from the center of the excavation bottom area.

Once the grid area was excavated to the design depths, post-excavation confirmation samples were collected to verify that all contaminated soil was removed. Additional excavation was conducted in the areas where soil contamination was detected at concentrations greater than the RGs. Upon completion of the additional excavation, another round of post-excavation confirmation sampling was conducted. Excavation and post-excavation confirmation sampling continued until remaining soil contaminant concentrations were less than the RGs. All samples were collected in accordance with N.J.A.C. 7:26E-6.4 (2).

Appendix H includes a log of the final post-excavation confirmation sampling results of the material left in place at the OU2 property. The results are presented in accordance with the grid system utilized for the OU2 remediation.

3.12.2. Waste Characterization

Waste characterization was performed in accordance with the accepted SAP. Waste Characterization sampling was conducted to classify soil for waste disposal. Typically, stockpiles up to approximately 250 CY were sampled and analyzed in accordance with the Subtitle C or Subtitle D disposal facility's requirements.

Soils where the analytical soil sample results for TCLP analyses exceeded the allowable RCRA criteria were identified as potentially hazardous waste material. Locations where samples exhibited PCB concentrations greater than 50 ppm were identified as potentially TSCA regulated material.

The excavated material, not subject to LTTD treatment, resulted in solid waste that fell into two basic categories:

- Hazardous waste that was disposed in a Subtitle C landfill, and
- Non-hazardous waste that was disposed in a Subtitle D landfill.

The different waste types that were disposed off-site are further defined in Table 3.

3.12.3. Backfill and Topsoil Material Samples

In addition to treated material used as backfill, clean material was imported to the OU2 property to backfill the remedial excavation, and to restore the OU2 property to the final grades. Imported material brought on the OU2 property was supplied by Maddox Materials, LLC and Stavola Companies.

Imported backfill was sampled in accordance with the QAPP to verify that the material was free of chemical and radiological contamination and that the material met specifications. Quality assurance (QA) samples of the imported material were collected in accordance with the QAPP.

Chemical analyses (including metals, semi volatile organic compounds (SVOCs), VOCs, PCBs, herbicides and pesticides), radiological tests, and physical testing (including particle size, compaction and moisture content) were performed by Mitkem at a rate of one sample for every 5,000 CY of backfill material imported to the OU2 property. The data did not indicate the presence of any contaminated soil; therefore, the soil was determined to be suitable for use as backfill on-site.

The backfill material data is included in Appendix I.

3.13. Waste Disposal

As presented in Section 3.12.2, waste characterization was conducted to classify the soils removed during excavation remedial activities. Classification of the soils was required prior to shipping to the approved disposal facility. Waste minimization, storage, handling, and load-out procedures were conducted pursuant to the Waste Management and Transportation Plan. All wastes generated during remedial activities requiring off-site disposal were sent to a licensed Subtitle C landfill or Subtitle D landfills, as determined by the presence of TSCA, RCRA or a combination of contamination detected during the waste characterization sampling. A letter was obtained for each disposal facility certifying that USEPA Region 2 considers the facility to be acceptable in accordance with the off-site policy established in 40 CFR 300.440. The treatment and disposal requirements for the different types of wastes are summarized in Table 4. The disposal facilities used during the implementation of the remedial action are provided in Table 5.

A total of 93,394 CY of contaminated soil was excavated and transported off-site for disposal. Materials were segregated into stockpiles corresponding to the different types of waste. The stockpiles were located within a specific area, typically at the former CDA. Prior to leaving the OU2 property through the approved hauling routes, the trucks were decontaminated, weighed, and manifested. A copy of the manifests and disposal documentation are included in Appendix J. The quantities of the generated waste for off-site disposal are also summarized in Section 3.14.

A waste-tracking log was prepared and maintained on-site for the duration of the project. The log contained all pertinent waste data including, but not limited, to manifest numbers, generation dates, material types, waste classifications, waste profiles, sample identification, weights, transporters, disposal destinations, disposal dates, and certificates of disposal. The waste-tracking logs are included in Appendix J.

The USACE also contracted with Los Alamos Technical Associated, Inc. (LATA) for off-site disposal of TSCA and TSCA/RCRA contaminated soils that were excavated by SES. LATA used SES' site facilities (e.g. scale and trailers) to perform the weighing and manifesting of these soils. SES performed the waste characterization of the material and forwarded it to LATA for approval. Upon LATA's approval of the waste characterization, LATA scheduled vehicles for the transportation of the waste. SES loaded the trucks, LATA approved the weights and the material was manifested and shipped. LATA shipped 36,783 tons of TSCA waste to Heritage Environmental Services, Inc. facility and 1,499 tons of TSCA/RCRA waste to Veolia Port Arthur Texas facility. Appendix M includes the Closeout Report provided by LATA.

3.14. Summary of Project Quantities

Phase	CY	Tons*
LTTD	65,333	98,000
Transportation and Disposal (T&D)	93,394	140,091
Total Excavated	158,727	283,091

*Weight was estimated based on volume

3.15. Backfilling

The excavation areas were backfilled using treated soils from the LTTD process (approximately 98,000 tons), on-site soils that had been excavated but did not require treatment, and imported material. The imported material used for backfill included DGA obtained from the following off-site sources:

- Stavola Companies, Bound Brook, NJ and Old Wick, NJ quarries; and
- Maddox Materials, LLC, 323 Main Street, Spotswood, NJ utilizing DGA from Weldon Materials Inc., Watchung Quarry, 1 New Providence Road, Watchung, NJ.

Upon completion of the excavation activities, all excavations were filled with existing OU2 soils, treated soils, and DGA and were compacted with a 10-ton roller.

Prior to bringing backfill from off-site sources to the OU2 property, physical and chemical analyses were performed on every 5,000 CY lot of material to ensure that backfill materials met the project requirements and specifications.

Backfill material was placed directly in the excavation and spread in horizontal layers up to 8 inches thick using bulldozers. To delineate the extent of excavation, a white geotextile fabric was placed over exposed soils that were left in place, covering soil that had not been excavated for treatment or off-site disposal because chemical concentrations were below the ROD criterion. Additional backfill was placed upon the white geotextile to bring the fill up to sub-grade. At the sub-grade elevation (15 inches below finish grade) a non-woven geotextile was installed. A minimum thickness of 9 inches DGA was placed for the pavement sub-base upon this geotextile. Approximately 26,237 tons of DGA material was placed in these areas and compacted by utilizing an SD-40D roller to a minimum of 95% of its maximum dry density by Standard Proctor (American Society for Testing and Materials, ASTM D-698). Compaction and moisture content testing of the backfill material was performed by ANS Consultants, Inc. located in South Plainfield, New Jersey.

During construction activities, approximately 340 concrete bin blocks (two foot by two foot by eight foot) were used to build temporary walls for containing and segregating stockpiled material and for miscellaneous utility protection. Following construction, the bin blocks were decontaminated using a power washer, sampled, and used in the construction of the Basin sidewalls, which enhanced structural reinforcement.

SES prepared and maintained a material delivery log of all backfill materials delivered to the OU2 property. The material log contains information such as delivery dates, ticket numbers, sources, and weights. The material delivery log is included in Appendix K. The results of compaction performed on backfilled materials are included in Appendix I.

3.16. Stormwater Conveyance System

The drainage system installed at the OU2 property consists of a series of concrete catch basins connected by HDPE piping (of varying diameters) which drain to the Basin. The Basin discharges to Bound Brook.

The HDPE pipes were installed within a clean material corridor, which consisted of a trapezoidal cross section excavation, with the pipe corridor excavation base lined with 40 mil HDPE liner. The trench was filled and compacted with clean DGA stone to pipe invert elevations, the HDPE pipe was placed, and then the remainder of the trench was filled with the same DGA stone to subgrade elevation. Near the lower end of each of the five clean material corridor trenches (just outside the exterior of the Basin's berm), a 12 inch diameter, vertical observation well was installed so that water levels can be observed in the clean corridor and pumped if necessary.

The entire drainage system drains into the Basin, which was constructed in an area predominantly excavated as part of remediation activities located at the northeastern area of the OU2 property. The Basin receives flow from a total of five new inlet pipes. Flow proceeds though one of two forebays, which are separated from the main chamber by baffles. This promotes the sedimentation of coarser grained materials. Water flowing into the main chamber discharges through an outlet structure onto an energy dissipater located adjacent to the Bound Brook floodplain.

The Basin construction consisted of the installation of 10 oz. geotextile placed on the floor and side walls of the Basin excavation. A 40-mil geomembrane and a geocomposite fabric were then placed upon the 10 oz. geotextile. Protecting the geomembrane and geocomposite layers was a 24 inch sand layer (serving as a sand filter) installed on the floor of the Basin and 12 inches of rip-rap installed on the sidewalls. Three water backflow prevention check valves were installed on the HDPE pipe of the drainage system. One in-line “Checkmate” check valve was installed in catch basin CB-6A. Exterior check valves were installed at the ends of the pipe at CB-16, influent basin pipe, and the outflow pipe from the Basin’s out-flow structure.

Continental Concrete Products, Inc. of Pottstown, PA provided the concrete catch basins. The HDPE pipe was procured from Lee Supply Co., Inc. of Charleroi, PA. East Coast Liner Co., Inc. of Toms River, NJ installed the liner system for the Basin.

Additional details on the design and construction of the storm water conveyance system are located in the *NJDEP Flood Hazard Area Individual Permit Checklist Application, Engineering, & Environmental Report for OU-2* (Appendix C) and Record Drawings (Appendix A).

3.17. Site Restoration/Engineering Controls

Restoration of the OU2 property was accomplished by installing engineering controls consisting of a drainage system, described above, and an asphalt cap consisting of nine inches of DGA sub base material and four inches of asphalt (4” NJDOT I-2 Base Coarse) installed throughout the OU2 property. Two inches of NJDOT I-4 Surface Coarse material was installed on top of the base material in the site area located south of the New Market Avenue extension.

Several paving companies were utilized to install the engineering controls (asphalt) as the restoration work was performed in stages. Crisdel Group, Inc. 240 Ryan Street, So. Plainfield, NJ and Tilcon New York, Inc. 625 Mt. Hope Road, Wharton, NJ installed the asphalt engineering controls on the DGA sub-grade surfaces. Asphalt paving was installed to the lines and grades indicated on the record survey.

Kaiser Landscaping, Inc., 222 Wilson Road, Somerset, NJ installed trees and shrubs along a portion of Spicer Avenue at the southern area of the OU2 property. This landscaping was performed to provide a buffer between the OU2 property and local residences as the previous vegetation was removed as part of the remedial action. The Borough provided input as to the quantity, size, and type of trees and shrubs that were planted.

York Fence Co., Inc., 100 Dukes Parkway, Inc. Hillsborough NJ, installed a six-foot-high chain link fence along Hamilton Boulevard and the New Market Avenue extension along the western and southern portions of the OU2 property. A six-foot-high chain link fence with vehicle and man-gates was also installed around the Basin by York Fence Co., Inc.

Utility service laterals were left capped at the street by Public Service Electric and Gas (PSE&G). The relocated utility lines (electric and fiber optics cable) traversing the OU2 property to the water tower were left in place along the northern property line. These poles provide fiber optics cable and power lines to the water tower which remains in use as a telephone cellular tower.

3.18. As-Built Survey

The final As-Built survey depicts the final topography of the OU2 property. The remedial construction As-Built survey is included in Appendix L. The As-Built survey was prepared by a professional land surveyor, Mountain View Layout, Inc. 117 Hibernia Avenue, Rockaway, NJ. ARCADIS provided the Record Drawings included in Appendix A.

3.19. Green Remediation

Green technology and practices were frequently utilized on the project in an effort to eliminate or minimize greenhouse gas emissions during the OU2 remedial action. Practices utilized on-site included the use of various recycled products, segregating recyclable materials for disposal, and the use of solar power where practicable. Solar panels were utilized to operate the perimeter air monitoring stations on the OU2 property (see above), reducing the use of non-renewable energy.

SES purchased Renewable Energy Certificates (RECs) from Sterling Planet through the Clean CHOICE Program. The third-party certified RECs ensured that each month, clean energy was being generated and delivered to the power grid. The purchased energy RECs increase the amount of pollution-free generated electricity contributing to the growth of the renewable energy sector, and decreased the need for energy generation from other non-renewable energy sources. The renewable energy is placed on the grid in an amount equal to the purchase size of renewable energy, thereby matching the OU2 power consumption with clean, renewable energy generation. The OU2 energy provider was PSE&G, which performed periodic meter readings to track energy usage.

The usage figures and costs for the OU2 remedial action is provided below.

Total Energy Usage (01/01/2009 to 07/01/2012)	359,700 kWh
Average Cost ($/kWh)	$0.16
Total Energy Cost (01/01/2009 to 07/01/2012)	$56,940

SES also utilized ultra-low sulfur fuels in certain project equipment to reduce greenhouse gas emissions. Emissions control devices were installed on major pieces of equipment utilized for the OU2 remedial action. The emissions control devices included diesel particulate filter systems Catalytic Exhaust Products and Tier IV engines. These filter systems reduced the diesel particulates by more than 90 percent, and hydrocarbons and carbon monoxide by more than 80 percent during the equipment operations.

3.20. Demobilization

Demobilization at the OU2 property was conducted following the majority of site restoration activities in September 2012. Demobilization included: removal of temporary construction support facilities; demobilization of personnel and equipment; removal of temporary construction barriers (e.g. fencing and warning signs) around the perimeter of the construction work zone; and removal of soil erosion control measures.

4. Chronology of Events

Significant events for the OU2 Soil Remedial Activities are summarized below.

Chronology of Events

Date	Event
September 30, 2004	USEPA signed OU2 ROD
June 27, 2008	Remedial Design approved
October 31, 2008	Task Order 0011 awarded and Notice to Proceed issued to SES
October 31, 2008	OU2 property mobilization
December 5, 2008	FSCD certification received
April 15, 2009	Excavation activities initiated
August 25, 2009	SES receives Temporary Discharge Permit from MCUA
August 25, 2009	NJDEP Air Permit Equivalency received
October 1, 2009	SES initiates material processing (screening)
November 3, 2009	MT initiates 24 hour clean material testing of LTTD
November 9, 2009	MT initiates contaminated material treatment
April 7, 2010	MT completes Proof of Performance testing
February 2, 2011	MT completes treatment of 98,001 tons of soil
July 12, 2011	MT completes de-mobilization
July 18, 2011	Storm Water Management system installation initiated
August 8, 2011	LATA initiates T&D of material
December 22, 2011	Contaminated material excavation substantially complete
January 31, 2012	LATA completes T&D of material
February 2, 2012	Completed storm pipe drainage system installation into the Basin
February 13, 2012	Completed installation of the Basin outfall piping and structures
February 13, 2012	Commenced remediation of Conrail right-of-way
February 14, 2012	Completed all contaminated material excavation

April 10, 2012	Completed water treatment system operations
April 11, 2012	Completed T&D of all TSCA material
April 24, 2012	Conrail confirms work on railroad right-of-way completed consistent with Conrail safety and engineering requirements
June 1, 2012	Completed asphalt cap installation
June 1, 2012	Completed Major Construction
June 4, 2012	Pre-final Inspection
Sept 12, 2012	Final Inspection
Sept 17, 2012	O&M Period begins

5. Performance Standards and Construction Quality Control

A Quality Control (QC) program that incorporated the requirements of the project specifications and the accepted OU2-specific Contractor Quality Control Plan (CQCP) was implemented. USACE provided QA using on-site personnel to monitor project performance.

5.1. Project QA/QC Organization

The OU2 soils remedial action was supported by both field and office personnel. On-site personnel for SES consisted of Project Manager, Contractor Quality Control Systems Manager (CQCSM), Site Safety and Health Officer, Project Engineer, and Project Superintendent.

5.2. Construction QA/QC Implementation

A three-phase system of QC inspection meetings was conducted for each definable feature of the work. The checks include preparatory, initial, and follow-up inspections. Preparatory inspections were performed after all required plans, documents, and materials were approved and copies were at the work site. Initial inspections were conducted after the completion of a representative sample of the work. Follow-up inspections consisted of daily QC activities to ensure compliance with contract requirements until the completion of a particular definable feature of work.

5.3. Sampling and Analysis

To accomplish the field sampling and analysis, SES prepared and implemented a QAPP and FSP. A total of 2,490 samples were collected and analyzed for the different operations performed as part of the OU2 remedial action. These included LTTD soil samples, water samples, moisture content samples, post-excavation confirmation samples, and waste characterization samples.

Sampling frequencies and analyses for the primary materials handled in the soils remediation process are summarized below and outlined in Table 6.

Pre-excavation soil sampling within the limits of soils excavated was limited to a total of four samples for dioxin. The samples were collected proximate to PDI boring number SB39, collected from each corner of a 10 foot x 10 foot square established around the PDI boring, with the existing PDI point at its center. Material containing Dioxin and Furans was transported off-site for disposal and was not treated on-site.

Post-excavation testing of debris that was disposed of off-site, including cobbles and boulders, was conducted at a frequency as specified by the approved disposal facility. Samples were analyzed for parameters as specified by the approved disposal facility.

Post-excavation confirmation sampling was required at a frequency of one sample per every 30 linear feet of sidewall, with a minimum of one sample per sidewall, and one sample for every 900 square feet of excavation bottom surface with a minimum of one sample per excavation bottom surface. This testing frequency was consistent with NJDEP requirements. Post-excavation confirmation samples collected from the sidewall and excavation bottom were typically analyzed for PCB Aroclors, VOCs, SVOCs, pesticide, metals, mercury and cyanide against ROD criteria for these contaminants.

Testing of stockpiled treated materials was required to determine disposition of the treated material. Samples were collected at a frequency of one sample for each day's treated volume, and were analyzed for parameters including PCB Aroclors, pesticides, VOCs, SVOCs, metals, mercury and cyanide. Material meeting QAPP criteria for the parameters tested was used as backfill on-site. Material failing QAPP criteria was treated again via LTTD until the criteria in the QAPP were met, and then used as backfill on-site. The proof of performance test sampling for the LTTD process was performed at a frequency of one sample for every 15 minutes of the proof-of-performance test.

Pre- and post-excavation testing was conducted at the LTTD treatment pad and surrounding stockpiling/staging locations. Five pre-excavation and five post-excavation samples were taken at regular spacing, as approved by the Contracting Officer. Samples were analyzed for the contaminants including PCB Aroclors, VOCs, SVOCs, pesticide, metals, mercury and cyanide.

The delineation of contamination along the northern boundary adjacent to the Conrail tracks (adjacent to former Building 1) extended to the property line as shown on the OU2 Remedial Design Drawings. USEPA obtained Conrail's consent to access in order to delineate and remediate OU2-related contaminants that were identified on the Conrail property. Accordingly, pre-excavation soil sampling outside of the OU2 property boundary was performed as determined by the Contracting Officer, and samples were analyzed for ROD criteria.

A QA/QC system was implemented to ensure the accuracy, completeness, and precision of sampling data. Collected field QA/QC samples included field duplicates, matrix spike, matrix spike duplicates, and QA split samples.

5.3.1. Field Duplicates

Field duplicates were defined as a homogenized sample collected from a unique location that was divided into two separate sets of containers and submitted to the laboratory as two unique samples for analysis. Field duplicates were collected at a frequency of one duplicate for every 10 samples. The QAPP contains worksheets and additional details regarding QA samples.

5.3.2. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD samples were collected to document the precision and consistency of the laboratory equipment. MS/MSD samples were collected at a rate of one sample for every 10 field samples. The QAPP contains worksheets and additional details regarding QA samples.

5.3.3. USACE QA Program

Field data were reviewed by the on-site CQCSM and SES' Project Chemist for compliance with established QC criteria. USACE reviewed Quality Control Summary Reports (QCSRs) prepared by SES. From October 2009 through December 2011, a QA split sample program was conducted in accordance with the *Quality Assurance Project Plan, Cornell-Dubilier Electronics Superfund Site, Operable Unit-2: Soil Remediation Split Sample Program* (Malcolm Pirnie, August 2009). SES collected final verification soil samples in accordance with the QAPP (April 2009). ARCADIS was responsible for analyzing QA split sample data collected during the sampling program. USACE authorized SES to physically collect QA split samples and ship them directly to USEPA-approved Contract Laboratory Program (CLP) laboratories for independent analyses. The majority of the split samples were analyzed for organic (PCB Aroclors, pesticides, VOCs and SVOCs) and inorganic (metals, mercury and cyanide) parameters by the assigned USEPA CLP laboratory. CLP laboratory results from split soil samples were validated by USEPA Region 2 data reviewers. A limited number of split samples were analyzed for radiological parameters and dioxin/furans by the assigned laboratories.

ARCADIS typically received preliminary data from split samples within a one week and communicated the data to SES and the USACE by e-mail as soon as the data were received. Final data on the split samples were typically received within one month and were also communicated to SES and the USACE as soon as they were received. A QA report comparing the split sample results to parent data was developed to document differences in the data. Copies of the QA reports can be found in Appendix N.

The following is a summary of the split samples:

- *Post-LTTD Split Samples:* Post-LTTD soil split QA samples were collected by SES from five percent of the approximately 398 piles of treated soils produced while the LTTD unit was operational.

- *Post-Excavation Split Samples:* 84 post-excavation split samples (or 9 percent of the post-excavation samples) were collected by SES.

- *Dioxin/Furan Split Samples Analyses:* A split sample and a sample duplicate of a post-excavation soil sample were collected by SES for Dioxin/Furan analyses on May 12, 2010. The data were documented in a QA memorandum dated on July 28, 2010.

- *Backfill Split Soil Sample Tested for Radioactivity:* A split sample and duplicate of backfill soil sample were collected by SES on November 2, 2009. A comparison of the results of the split sample analyses were documented in a QA memorandum dated on January 11, 2010.

5.3.4. Data Review/Validation

The QCSRs were developed upon receiving validated data from the laboratory. QCSRs include a summary of all chemical sampling activities and included an evaluation of the achievement of project Data Quality Objectives. In addition, analytical data were reported electronically in a format consistent with the Electronic Data Deliverable (EDD) format specified by USEPA Region II, as documented in *Electronic Data Deliverable (EDD) Comprehensive Specification Manual 1.1* (November 2007), and current updates. Reporting requirements for the Analytical Services Tracking System (ANSETS) were followed for all work performed by the subcontracted laboratory. The QCSR's can be found in Appendix N.

5.3.5. Sample Numbering

A sample-numbering scheme was developed to identify each sample designated for laboratory analysis. The purpose of this numbering scheme was to provide a tracking system for retrieval of field and analytical data of each sample. A summary of the sample numbering scheme is presented in SES' approved FSP and briefly described below.

A unique sample numbering scheme was used to identify each sample designated for laboratory analysis. Sample identification numbers was used on all sample labels, field data sheets or logbooks, chain of custody records, and all other applicable documentation used during the project. The sample identification scheme used for the project is as follows:

- Off-site backfill and topsoil samples are labeled: CD-BF-xx or CD-TS-xx
  - CD-BF/CD-TS: Project site and sample type (Cornell-Dubilier backfill sample or Cornell-Dubilier topsoil sample)
  - xx: Sequential sample number

- Solid waste characterization samples are labeled: CD-WC-xx
  - CD-WC: Project site and sample type (Cornell-Dubilier waste characterization sample)
  - xx: Sequential sample number

- Wastewater characterization samples are labeled: CD-WW-xx
  - CD-WW: Project site sand sample type (Cornell-Dubilier wastewater sample)
  - xx: Sequential sample number

5.4. Health and Safety

As required by the SSHP, daily tailgate meetings were conducted. Special health and safety considerations were discussed as they pertained to the daily activities. Weekly meetings were also held to review issues related to any new activities. Moreover, SES' Health and Safety Director, Paul J. Hitcho, CIH, conducted periodic Health and Safety inspections during the course of the project. Throughout the duration of the project, there were 294,801 safety man hours.

General site workers were trained for Hazardous Waste Operations and Emergency Response (HazWOPER) in accordance with 29 CFR 1919.120, and for excavation and trenching safety training. Individuals involved with shipping of hazardous materials were required to receive the appropriate Department of Transportation (DOT) training. Most of the work was conducted in Level D PPE, except for personnel in direct contact with the material were required to work in Level C. Ambient air monitoring, in the form of real-time VOC and dust monitoring and occupational low-flow pump sampling was also conducted within the vicinity of the excavation areas throughout the period of remedial activities as discussed in Section 3.6.

5.4.1. Personnel Exposure Air Monitoring

The following information is supported by the monthly air monitoring reports developed during excavation, soil preparation, and LTTD activities conducted April 2009 through June 2012 as part of the OU2 soils remedial activities.

- PCB, lead, TCE and total dust air samples were collected. The air samples were collected on a weekly, and/or monthly basis as applicable.

- The air samples were collected in accordance with NIOSH test methods 5503 for PCBs, 7300 for lead, 1022 for TCE, and 0500 for Total Dust. Real-time particulate air monitoring conducted using TSI Dust Trak air samplers and real-time VOC monitoring using RAE gas detectors was performed.

- Galson Laboratories located in East Syracuse, NY, and Con-Test laboratories in East Longmeadow, MA were contracted for off-site analysis of air sample media.

5.4.2. Personnel Decontamination

Personnel decontamination was performed upon exiting the EZ. Basic boot wash and rinse techniques were employed to maintain contamination controls as workers exited the EZ through the CRZ. Shower facilities were available within the support zone. Personnel exiting the EZ during remedial activities at the OU2 property followed the procedure below.

As the workers left the EZ, they placed their equipment and tools in the EZ or CRZ. After workers placed their equipment and tools down, gross contamination was removed from outer clothing and boots. Workers then removed their outer boots and outer gloves and place them in plastic garbage bag-lined containers. Once outer gloves were removed, workers removed all outer garments and place them in plastic garbage bag lined containers. Once workers were fully decontaminated and all garments were removed, workers removed their respirators (applicable to Level C) followed by removal of inner gloves. Used cartridges and inner gloves were placed into plastic garbage bags. The change trailer was used by the on-site staff for short breaks during the workday. The trailer had an area for changing, washbasins, and counters. This trailer was considered part of the Support Zone and was not entered from the CRZ unless the individual had completed the outlined decontamination procedures. All hand equipment was decontaminated before being brought into the trailer. All used PPE was disposed with the waste generated from the OU2 property.

5.4.3. Equipment Decontamination

All equipment exiting the EZ was decontaminated prior to entering the support zone or leaving the OU2 property in accordance with the SSHP. A decontamination certificate was generated before any equipment was transported off-site. All decontamination water from personnel and equipment decontamination was processed through the on-site water treatment system. Nearly all hardware (not consumable) was considered recoverable. As such, they were decontaminated using the proper equipment (e.g. brushes, sprayers, detergent and, if necessary, other appropriate solvents). Large heavy equipment was decontaminated with pressure steam wash as required to remove contamination. The decontamination area for vehicles and equipment leaving the EZ was located within the CRZ. Equipment was decontaminated in a manner that allowed all water and dirt to flow back into the EZ. Scrapers and brushes were used to remove gross contamination prior to final decontamination. A pressure washer or water hose was used for the final cleaning and decontamination of the equipment. Efforts were made to minimize soil (even non-contaminated soil) from being tracked off-site. Dirt and mud were removed from trucks and vehicles leaving the OU2 property.

6. Inspection and Certification

6.1. Inspections

A CQCP was implemented to ensure that remedial and construction procedures were performed in compliance with the plans and specifications of the OU2 soil Remedial Action. As part of this plan, a three-phase inspection was performed for all substantial work activities. A pre-final and final inspection of the OU2 property was performed following the completion of the OU2 soil Remedial Action. The purpose of these inspections was to ensure that all work was performed to the satisfaction of the USEPA and USACE. These inspections were documented on the USACE's RMS system as well as in the weekly progress meeting minutes.

6.1.1. Pre-Final Inspection

A pre-final inspection was held on June 4, 2012. Representatives from USEPA, USACE, and SES were present. The following punch list items and deficiencies were observed and corrective action was required:

- Construction sign required removal;
- Repair of holes;
- Demobilization of trailers; and
- Closeout reports.

6.1.2. Final Inspection

On September 12, 2012 upon correction of all deficiencies and submittal of outstanding project document, representatives of USEPA, USACE, NJDEP, and SES attended a Final inspection. At this time, no punch list items were identified. The USACE acceptance letter is included in Appendix O.

7. Operation and Maintenance

The Operation and Maintenance (O&M) Plan (May 2011) as amended is included in Appendix Q. This O&M Plan addresses the O&M regulatory requirements for the stormwater management measures as required by NJDEP. The creation of this plan was pursuant to N.J.A.C. 7:8 Stormwater Management Rules and this O&M Plan contains the required elements described in the NJDEP *Stormwater Best Management Practices Manual* (2004), Chapter 8 – Maintenance and Retrofit of Stormwater Management Measures and Chapter 9.9 – Standard for Sand Filters.

The plan addresses the inspection routine and long term maintenance required for the Basin, Pavement, and Tree Grove. The O&M Plan contains specific preventative and corrective maintenance tasks, schedules, and the name, address, and telephone number of the person or persons responsible for the measures’ maintenance. General maintenance issues such as fencing, pavement, and removal of vegetation identified will be addressed during the operation and maintenance period.

8. Contact Information

The contact information for key project personnel is included below.

Key Project Contacts

Name / Title	Organization	E-Mail Address Phone Number	Office Address
Diego Garcia / Project Manager	USEPA	Garcia.Diego@epa.gov 212-637-4947	290 Broadway New York, NY 10038
Carlton Bergman / Case Manager	NJDEP	Carlton.Bergman@dep.state.nj.us 609-633-6621	401 East State Street Trenton, NJ 08628
Kenneth Maas / Project Manager	USACE KC	kenneth.e.maas@usace.army.mil 816-389-3709	601 East 12th Street Kansas City, MO 64106
Neal Kolb / Environmental Resident Engineer	USACE NY	Neal.F.Kolb@usace.army.mil 732-846-5830	214 State Highway 18 East Brunswick, NJ 08816
Patrick Nejand / Contracting Officer's Representative	USACE NY	Patrick.C.Nejand@usace.army.mil 732-846-5830	214 State Highway 18 East Brunswick, NJ 08816
Kim W. Lickfield / Project Manager	SES	KLickfield@sevenson.com 716-284-0431	2749 Lockport Road Niagara Fall, NY 14305
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10. Acronyms/Abbreviations

ARCADIS	ARCADIS-US, Inc.
ASTM	American Society for Testing and Materials
Borough	The Borough of South Plainfield, NJ
bgs	below ground surface
CDA	Capacitor Disposal Area
CDE	Cornell-Dubilier Electronics, Inc.
CQCP	Contractor Quality Control Plan
CQCSM	Contractor Quality Control Systems Manager
CRZ	Contaminant Reduction Zone
CY	Cubic yard(s)
DANA	Dana Corporation
DAR	Design Analysis Report
DGA	Dense graded aggregate
DOT	Department of Transportation
E-Sampler	Met One E-Sampler
EZ	Exclusion Zone
FS	Feasibility Study
FSCD	Freehold Soil Conservation District
FSP	Field Sampling Plan
FWENC	Foster Wheeler Environmental Corporation

HazWOPER	Hazardous Waste Operations and Emergency Response
HDPE	High Density Polyethylene
IGWSCC	New Jersey's Impact to Groundwater Soil Cleanup Criteria (May 1999)
IDS	Indirect Desorption System
LATA	Los Alamos Technical Associates
LTTD	Low-Temperature Thermal Desorption
MCUA	Middlesex County Utility Authority
MT	Maxymillian Technologies
Mitkem	Mitkem Laboratories, 175 Metro Center Blvd., Warwick, RI
N.J.A.C.	New Jersey Administrative Code
NJAW	New Jersey American Water Company
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
OU	Operable Unit
PCB	Polychlorinated biphenyl
PDI	Pre-Design Investigation
POTW	Publicly Owned Treatment Works facility
PPE	Personal protective equipment
PSE&G	Public Service Electric and Gas
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control

RAE	RAE Systems Area RAE
RAR	Remedial Action Report
RCRA	Resource Conservation and Recovery Act
REC	Renewable Energy Certificates
RGs	Remediation goals
RI	Remedial Investigation
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SES	Sevenson Environmental Services, Inc.
SSHP	Site Safety and Health Plan
SVOC	Semi volatile organic compounds
T&D	Transportation and disposal
TCLP	Toxicity Characteristic Leaching Procedure
TSCA	Toxic Substances Control Act
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compounds
WVN	Work Variance Notification

Tables

Table 1
Major Subcontractors/Vendors

Name	Associated Activities/Services
A&M Industrial Supplies	Miscellaneous small tools and supplies
Atlantic Lining Co.	CB Containment membrane installation Subcontractor
Adler Tank Rentals, LLC	Water storage tanks Vendor
ANS Consultants	Soils Testing Consultant
H.W. Alward	Plumbing Subcontractor
Crisdel Group, Inc.	Paving Subcontractor
Continental Concrete	Concrete Catch Basin Supplier
Dival Safety	Safety Supplies
East Coast Liner Co., Inc.	Basin membrane installation Subcontractor
EQ- The Environmental Quality Co.	Transportation and Disposal Subcontractor
Essential Security, Inc.	Security Subcontractor
Galson Labratories	Air Analytical Testing Lab
IWT Cargo Guard	Geo-membrane Supplier
Lee Supply Co., Inc.	HDPE Pipe Supplier
Maddox Materials, LLC	DGA Supplier
Maxymillian Technologies, Inc.	LTTD Subcontractor
Mitkem Laboratories	Analytical Testing Lab

Modspace Corporation	Trailer Supplier
Mountain View Layout	Surveyor
One Call Electrical Services	Electrician
PaveRite, Inc.	Paving Subcontractor
Stella Contracting	Clearing & Grubbing Subcontractor
Stavola Companies	DGA Supplier
Tilcon New York, Inc.	Paving Subcontractor
Universal Fabric Structures	Temporary Structure Supplier
York Fence	Fence Subcontractor

Table 2
Air Monitoring Requirements

Active Work Area		
Type of Measurement	Concentration	Action
Total Particulate	Less than 1.0 mg/m^3 Greater than 1.0 mg/m^3	Continue work with air monitoring. Upgrade to Level C PPE, initiate dust control measures.
Lead in air	Greater than 25 μg/m^3	Upgrade to Level C PPE, initiate dust control measures.
PCBs	Greater than 250 μg/m^3	Upgrade to Level C PPE
Total VOCs (Organic Vapors)	Less than 1 ppm above background Greater than 1 ppm but less than 5 ppm *Greater than 5 ppm above background sustained for 15 minutes *Greater than 15 ppm above background for any period of time *Greater than 250 ppm above background for any for any two successive readings within a 15-minute period	Continue work with air monitoring. Pull benzene and vinyl chloride tubes Upgrade to Level C PPE and collect benzene and vinyl chloride tube Upgrade to Level C PPE and collect benzene and vinyl chloride tube Stop work, evacuate personnel upwind, notify Contracting Officer's Representative
Benzene **Dräger tube 8101841 or equivalent	Greater than 0.5 ppm Greater than 10 ppm	Upgrade to Level C PPE Stop work; notify SHM and

		COR
Vinyl chloride **Dräger tube 6728061 or equivalent	Greater than 0.5 ppm Greater than 5.0 ppm	Upgrade to Level C PPE Stop work; notify SHM and COR
Combustible gas in air	> 10% LEL but < 25% LEL > 25% LEL	Stop work; Ventilate workplace Stop work; Evacuate area & investigate source
Oxygen in air	Less than 19.5% Greater than 22%	Stop work; Ventilate workplace Stop work: Ventilate workplace

*These values are independent of benzene or vinyl chloride.
** The tubes were selected for detection limit and limited interference with other chemicals associated with remediation.

Continuous Emissions		
Type of Measurement	Concentration	Action
Real Time Vapor Monitoring	2 ppm (15 minute) 0.5 ppm (Work shift)	First Instance: Evaluate engineering controls, implement vapor emission control. After an hour: the above steps plus Stop Work and notify COR. Resume work after COR acceptance of control measures
Combustible gas in air	More than 10% LEL	Evacuate area
Oxygen	Less than 19.5% or more than 22%	Evacuate area if oxygen levels out of range.
Perimeter Particulate Monitoring	Less than 65ug/m3 average in 24 hour period	First 15 minute average reading above concentration: Notify USACE and subcontractor personnel, initiate site evaluation Second consecutive 15 minute average reading above concentration: Continue investigation of sources of elevated readings and implement corrective action.

		Third consecutive 15 minute average reading above concentration: Instruct subcontractor to stop treatment of contaminated material. Forth consecutive15 minute average reading above concentration: Initiate shut down procedures of LTTD unit.

Table 3
Waste Categories

Waste Type, Designation	Waste Definition
Debris, Non-hazardous	§ Asphalt § Concrete slabs and sidewalks § Sewer pipe from storm sewers § Other remnants from buried building materials or boulders § Tree stumps from grubbing operations
Soils, TSCA, PCB's >50 ppm, treated soils	§ Soils/debris from excavations
Debris, TSCA, PCB's > 50 ppm	§ Soils/debris from excavations § Asphalt § Concrete slabs from remnants of building foundations and sidewalks § Buried Pipe Chases
Debris, Mixed Waste, both TSCA and RCRA (TSCA > 50ppm)	§ Soils/debris from excavations § Asphalt § Concrete slabs from remnants of building foundations and sidewalks § Pipe Chases

Table 4
LDR Hazardous Waste Disposal Requirements

Waste Type, Designation	Treatment Requirements	Disposal Requirements
Debris, Non-hazardous		Dispose of in Subtitle D landfill
Debris, TSCA, PCB’s > 50 ppm		Dispose of in Subtitle C landfill
Soils, RCRA Waste fails TCLP	Stabilization Required	Dispose of in Subtitle C landfill
Debris, Mixed Waste, both TSCA and RCRA (TSCA > 50ppm)	Stabilization Required	Dispose of in Subtitle C landfill
Decontamination water and Groundwater	On-site Water Treatment	Dispose of in POTW Facility
Debris, TSCA, PCB’s > 50 ppm		Disposed of in Subtitle C landfill LATA Contract

Table 5
Material Disposal Facilities

Facility	Address	Permit No.	Facility Type
IESI Bethlehem Landfill	2335 Applebutter Road Bethlehem, PA 18015	PA# 1000020	Subtitle D
Clean Harbors Deer Park Facility	2027 Independence Pkwy So. LaPorte, TX 77571	TX # 055141378	Subtitle C
Clean Harbors Environmental Services, Inc.	Exit 41, Rte. I-80 Grassy Mountain, Utah 84029	UTD 991301748	Subtitle C
EQ-The Environmental Quality Company	49350 N I-90 Service Rd. Belleville, MI 48111	MID 048090633	Subtitle C
Clean Harbors Aragonite, LLC	11600 North Aptus Road Tooele, Utah 84029	#700-88	Subtitle C
LATA Disposal Facility Heritage Environmental Services, Inc.	4370 W CR 1275N Roachdale, Indiana	IND980503 890	Subtitle C
LATA Disposal Facility Veolia Port Arthur Texas	Highway 73 Port Arthur, Texas		Subtitle C

Table 6
Soil/Debris Sampling Frequency Requirements

Component	Material Origins	Frequency
PCBs, organics	LTTD proof-of-performance test	Every 15 minutes of test
Dioxins	Pre-excavation (in-situ) proximate to dioxin detection area – see Design Drawings	4 samples, one at each corner of a 10’ x 10’ square with the existing data point at center.
PCBs, organics, and inorganics	Post-excavation debris (prior to off-site disposal)	per disposal facility requirements
PCBs, organics	Post-treatment verification sample	1 sample per each day’s treated volume
PCBs and IGWSCC listed contaminants	Post-Excavation Soil Confirmation Sampling – Sidewall	1 sample/30 lf and min. of one sample per sidewall
PCBs and IGWSCC listed contaminants	Post-Excavation Soil Confirmation Sampling – Base	1 sample/900 sq. ft. and min. of one sample per base
PCBs and IGWSCC listed contaminants	Pre- and Post-LTTD treatment pad construction and demolition	5 samples at regular spacing, as approved by Contracting Officer
PCBs and IGWSCC listed contaminants	Pre-excavation sampling outside of OU-2 boundary	As determined by Contracting Officer